An inaugural essay Respiration Tubmitted to the examination Reverend John andrews. D.D. Provost. Trustees and medical Professors of the university of Pennsylvania. For the Degree of Doctor of Medicine thousand eight hlindered & eleven. By John D. Perhins of Maryland.

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## an essay re.

The difficulty in selecting a subject for an inaugural differtation will hot be thought inconsiderable by those who have had occasion for making the
trial. The causes from whence originate the
difficulty are as numerous as the various sources of
error. The nott common is the almost curpof
sibility of advancing any thing new - and a second
may be, that to write with ease and perspiculty on
subjects that might be improved requires no inconsidecable portion of talent and a habit of commit
ting our ideas to paper.

The first of these I shall exase to regret as a source of uneasiness; for we are told "that there is nothing in new under the sun" - and the grievance arising from the second will soon exase to give disturbance, when I reflect how little will be expected from a young the man newly entering the field of science, whose genins if he properses any has not get been matured by experience or extensive observation.

An a mer right tat with wor my o thou be a the. bare esec has eng as co eu ho In attempt to make any improvement on the opinions of men of seience, tracticularly on the function of the Lungs, a might be considered unimportant - but when wereflect that ideas however sublime are liable to be stained with error, and that many of the functions of the human body still remains inesophicable or very imperfectly knowing any effort to establish the truth no matter how febles should not be condemned by an illiberal censure.

The true Physiology of the hungs has been thought to be ascertained to such an absolute certainty that few of the modern writers have attempted any improvement, barely contenting themselves by making extracts and escelusively following the opinions of others, who they had conceived to have treated the subject with the quatest success. But during the course of the following enquiry I shall attempt such a statement of facts, as well tend to prove that error has not only been counteranced but generally committed, in almost every attempt that has been made to improve this part of seience.

and the many the first property of the state of It is every of designed hard a late to the theory was ton oine at edear housener, while we want to be ent the cores, and the factor of the facilities of the Me steel accounted and a survey of the survey of the survey of inge when the contract the beath in and the the . And the same and the second second second second -ises The Every Human Corn of the freshy has week the a seed to the South of the state of the stat -tho sho exp Market Breezeway There was a fine fire the second the col -9/2 Markey No was as I have been as a difference of the second ae -te 10 le It is true that no subject ever engaged so unuch the attention of medical Philosophers as that of which we are a going to treat; and it is amusing to look over the different theories which for centuries have entactained the medical world - while some are to be admired for ingeneity alone; others, less instructing, have confused at the subject by drawing mistaken inferences from premises originally good.

I shall leave unnoticed many opinions, which although, once were in high estimation have not the least shadow of truth much less do they contribute to the explanation of the animal functions.

The manner in which respiration was performed could not fail to interest the earliest medical enhave exercised quat ingenity
-quiners, and men of abilities in ende avouring to
account for it. ... armong the numerous writers on this subject, we find the celebrated Boerhaue
whose theory was advocated by men of the most
lively genius; and if reputation alone would entitle

is long took no suited the experience of the total n op A second and a second and a second as a second as ecept we do deed a passe it is a successful and a property with the telephone haa t theories sometimes for the south the edicat leaving a colon notice on the contract the party. 'in bo went acrace, which we want to the me acrace of exal question the decrease here been able to the second with be for \* amiganish form hers - vest I that leave wastered health of which to heath the ·fici the state many in the state of the state of Down of leath course les as they contribute to the alw eller where of the abunual functions. and The second was a second despes of the second of the second and and record of the earliest for execution of the second constitution of the constit a si ver hu tomore the extremental and the way the second of the second cou the without and with the first the contract the the vef The many was a described to the same formatte cor an opinion to credit, there is more that would be more acceptable than that of the wise the illustrious Bon haave.

There are many opinions which at first appear to be both ingenerous and plausible, but when minutely examined, error, that too often concealed visitor, will be found "disfiguring the face of wisdom" - this I am persuaded will be the case, on entering an impartial in westigation of the theory of Boerhaave, and will be sufficient to prove that the ideas of great men are not always great.

The opinion of Boerhaave on the alternate rising and falling of the chest is briefly this - he supposed that a smaller quantity of blood is transmitted to the left wentricle of the heart in consequence of the distended hungs prefsing on the pulmonary veins; hence he concludes that left blood will circulate through the vefsels supplying the cerebruar and cerebellum; in consequence of which, there will be a pancity in the secretion of newous flind - hence the Diaphrague

ements enough there is mone that device in mone nd i healer than a look of the face he could seem in the ives t rain nou their our man a war in a somethat e other A amones, when that too often concepted providence nee nows desperance the lace of wholes - This I say -crec deader could be the ease on enterior and factioned oper togetion of the training of Hospitanoe, and wife he say Salus mu es great ... asce the operators of those are not the actions of room a ch alline of the exect is become the a constitution war caller on dealth of whom in reachast the transition but recle of the heart in consequines of the sixtende thi and liveldering on the fending was received because the suf edieses that her blood with consider the safe the bale outpliers the cerebone and centralists nej degraines of relaced there would be a surrect in the for seem tione of increases from the ich et a demonstra

and intercostal muscles will be relaxed, but no sooner does the blood flow in a more plentiful stream to the brain, than the secretion of nervous fluid be comes more abundant, and the instinatory muscles being strengtherio, immediately renew their action. .. A reflection naturally arises, which causes us at once to withold our afsent to this opinion - If the in. -crease or diminution of a nervous fluid would thus operate on the instructory muscles, why does not the same cause affect the heart, as well as every other musele of the body? as far as we have been able to

nuscle of the body? as far as we have been able to ascertain, the nerves operate alike on all muscles, and a change in the operation of one, we should think would produce a similar change in those of others. but we have still more powerful reasons for rejecting this opinion. It has been intimated that Boerhaave supposed, "a slaw circulation through the pulmonary nepsels, was caused by the prefour of the esepanded ting now esoperience directly contradicts this afsertion, for it is known that an injection will hap through

come conservation in your will be reliaved but no sooner ment of whose fire is a more flest full stace to these between the his secretion of mounts placed becomed was a fire and the additional to be been been been been a the explored and a second of the continues as him a second with a lastion is almally anded which cauded us at over to contract one a dear to last operator - if the en \* hote when the hungs are collapsed, the vefsels must be corrugated, in order to follow the cellular Structure of the hungs - consequently an injection will find more difficulty in passing thro'a curved ticke than a straight one. Enough of some was a such as when age in hosts of a theath all years as a street expenses that it is the series of th miles carrier and be a marked and of the contract Soling man experience see to contrate they after their the start that I was not as a second of a complete the

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the vefsels of the Lungs with more facility when the chest is inflated with air than when the lungs are collapsed. again, if this theory were correct, the force of the heart would always be less when the Lungs were inplated, and the weakness would be observable in the pulse - which how - ever is not correct weither is their any irregularity in the Julsations of the heart and arteries either during inshi-- ration or expiration a Lastly if by an excertion of the will, we reprain from breathing for some time, the moment we case the escertion the inspiratory muscles renew their action with redoubled vigour, which could not profsibly be the case if Boerhaaves theory were count for investily the air begins to inflate the lungs, ac--cording to his idea, the blood would circulate slowly to the diaphrague and interestal muscles, and they would be unablito renew their action on account of a rearry supply of nervous flind. un

more erroreous than the one we have noticed, has not long since been advanced by a writer in the Edinburgh

the constrat the hones of with a residence to the short exacted and sie than is for the energy in collaboration the hours of their theory were empered the house on the harrist the exception of age to be observable in the feether where the finished atomisting the hoesest and an horized outton decrease and his easterned extended a hartle of by an exection of the will sur as how who we have be about bear the more continue ecode the ease too the endposition underly we can there we there weath we done been been and in or most feel fell to the ends of Hospitalise them were come to me the interference in frequents conficted the lieuristan he constant the list where the livest usould executed in the server on the dearbest and interested mudeled and the every the be exceeded to se here the content on account of a secret the suchling our was think in .... tho the ma as decree have a surrect to a contact with the contact of

medical essays, who percuing the very striking objections to the theory of Boerhaave or some others, has attempted an explanation of the alternate rising and falling of the sheet in a manner which the author thinks less liable to error; but if I am not mistaken his ideas are more remote from truth than any that has yet been ad vanced. The writer begins by commenting on the wisdom and goodness of the Lupreme Being for having so weisely framed our system, that the disphragm the great musch of in--spiration" should be supplied with nerves from a distant origin and he demands with apparent escultation, why the phrenic verves are not formed from the pleasers of the parvageum? The writer observes, that the phrenic nerves originate from the middle cernical nerves, and, that they travel down through the chest of lie so eschooled that they are liable to compression by every dilation of the thorax - Having advanced thus far, the author thinks that respiration may be explained in the following manner. - at the end of expiration when the lungs are supposed to be collapsed, the nerves of the

medical often wind perintered by the hour of the hours of georges to the theory of American a course of the for a the well and an exalacation of he alternate revery and falling of the siest on a head were comes in the new took to head to the sale; the total of some and the attended here is a state of the land assume from the few as a source of the of deep at mount The located be consisted in commercial as a further some sinds appelling of the Later care have a hard had an had been haded to me of the line the residence in the coal and always and expensetion observed be no plined earth increase rome a distinct 130 ha the lebeline we we well and for seed finger the please is of the -cr harmon some the contite and that the the historic man Inc total the read of the ment of the conservation of the first ouly dequel down them in the original alea to explosed that lua one leading to conference in sixu relation of the color itis Ent replecements on acres in the consecution of the following celte Euic. The 8

diaphragm are supposed to be free from combression, and the newons fluid, or whatever is communicated to the muscular fibres finds on easy profrage to the muscles of instriction, which latter immediately contract and enlarge tohence the air rushes in; but no sooner does the pressure from the instrind air become any wise quat than the nervous influence over the diaphragmeeases, this musele is related and expiration follows of course, The resemblance between this last theory and that of Boerhaaves, appears very striking - they suppose the motions of the diaphragin to be influenced by an in--crease or diminution of nervous fluid, and that the proximinate cause of this is from compression; the only difference is, that one supposes the pressure to be applied to the Julmonary veins, preventing a too colinous secretion of nervous fluid - the other that it is applied to the phrenic nerves only, and that the alternate rising & falling of the chest depends on the quick or slow circulation of a nervous fluid. in The objections to Boerhaaves theory will equally apply

destinating an disposite to be free from course or and the recognition to the content of we consider to the underwar filled found an Eday ways to the or where of institutions which latter include alid contract and approximate and a six of a six of the six of the six newferth of the six of t than the necessariations are now the analous for explose oi the surred is whater and experiention following from 1 les The resolutioned between this last theory and thist of m - 20 decharged onpered our thicking - the Suprada the set institute of the displaceage to be suplemed by a desirely mo ma termentered and their extern court reflectiffe me phe in sifference is that one dupinoded the headers to lec. expelsed to the pulmonary needs, nearenting as too abl orners territion of newsons plans - the other that agai to a former to the linearie accuration, and the the deliver some of the -cua and weak or store or cubulation of an exercise fine of a The objections to Boschward their with expectly with Lung incontrovertible. If by the diaphrague could be relaxed from a slight combression of its phrenic nerves, and exchination the natural consequence of this relaxation, it would be impossible by any effort of the will to retain the chest in a distended state longer than in ordinary instrination, be cause the diaphrague would be impossible relaxed as soon as the inflation because any wise great.

To attempt any faither comment on the above would be useless, as I am convinced that every one who maturely reflects on the structure of the hungs and the phenomena attending the process of respiration must be convinced that the above theory is far from being able to encounter the objections that weight be arged against it. — I shall therefore process to the escale ination of those opinions that are more plausible and generally received.

Lungs, then are none who stands higher in reputation

to their last and i shall and and son more where I some the encontrover table - of he the deal heap in cours be alaked from a supplie con we die of the fine civic weres, and explorantions the notional conservations of the enhance their the occuption or sentences whole longer transition 60 olo To attend the aim forther connecut on the allower ones he except as law considered tient cosy one who levi estants extract on the otimeture of the hunge and the gac -fi is considered that the above theory is far from build ace a to encounter the objection that majest be enjoy to to ainst it. . I shall therefore (nover) to the execuheli - hen by a war description we are seen the I'm cologies the to com dopper there are worker when a law in day in the low tentions those than the justly celebrated by Whyth, and none whose opin ions have met with more general approbation; his ideas on the process of respiration, I believe to come neares the truth than any that has yet been advanced; but still same persuaded there is room for improvement and I hope my efforts to attain a greater perfection, will not be condemned because my opportunities of acquiring information have not been as great as many who are both older in wisdom and esoperience.

It is to be remarked that every function of the human body was at one time thought to be inesplicable; what's gave origin to this ruinous supposition was, the inefi-ficient and fruitless attempts that were made to account for the various functions; most of them failing to throw much light on the subjects it was at length a believed that the human body was governed by a surbeneficial that the human body was governed by a surbenatural power. that all its motions were directed by a sensient principle or a residing soul; and it was thought bejond the reach of human understanding to comprehend the laws of a Divine creator. - but since these days of allusion & ignorance have passed. the

la ar with there are that had not been somewhat have the he was evaluated the second of the formal as the second of st w ces and and waster has been but from the many topics and in a continue in a secretary of car it is to be remained that ever a function of the human as was at one time thanglet to be incomined the will opened to the seemond or wood this and the energy has un and ount for the continue functions, most the failed -tia in 7 the part to be the state of the same of the state of the ches and these the heart win body was a restrict the a treet bibe the o Andrew Committee in a color of the service of the by a with the season of the same with the sound the same fill. whe is suy

laws of nature have been beautifully unfolded by the genius and industry of bright men, and we now have wason to believe that "there is nothing mysterious but what shall be unfolded" and that the science of Thysiology will soon appear to be as simple and comprehensive as it was formerly supposed doubtful and intricate. we will now proceed to notice be whythe theory on the cause of respiration and will take such hints from him so as well serve our own ideas. ...

Dr Whyth supposes that the process of respiration is under the insured i ate quid ance of a sensient principle and that its object is to relieve an unpleasant sensa. -tion in the chest, arising from an accumulation of blood in the lungs - that the mind in order to relieve the chest, is stimulated to act by a pressure on the sensible & bibies of the hungs - that the nervous influence upon the diaphrague is thereby increased - that this muscle by its contraction ailates the thorase, - the hungs are filled with air, and thus the uneasiness is removedwhen the instinatory muscles cease to act, expiration is supposed to be the consequence of the elasticity of

the 7 Auc the see the second of the track the forest of the problem pla -tio prin The contest was a south of the contract of the theory on the con the of section we want to be a cold of the state with the section with the section of the sectio iner brow polonyth secures of their warming expression is of wi se the en wides to en there is a secretarial frederical from that it should it to when it is a will had and the at to tion in the enote an very me as seemed ation of blood yet the corner that the house is not a relicue the the s at en alementation to we the a collection on the sendelle on the and of the history of that he convent influence afron to pro and the digner of there he has need - that this headed unde to asserte entire the late the forming of the hours are both 1 in the contractor meren ecese that the contractor dider to produce the extract of the charles of the Here the cartilages of the ribs. This theory appears to be very rational, but I am persuaded it has some imperfections. I In the first place, I cannot reconcile the idea that any of the functions of the body are under the guidance of an intelligent principle - This doctrine would not accord with the common ideas of the Soul . - "The soul is said to be an immortal spirit, given to man to distinguish him from the rest of the creation of to direct him in the hath of wirtue and But if this shirit is inherent in man from his earliest infancy, it is certainly it quiescent at this immature age, because the infant count as yet distinguish between good and evil, consequently if the soul escists at this period, it can have no influence on the mental or bodily faculties: this then is sufficient to prove that the brocess of respiration cannot possibly be under the guidance of any thing but what oberates both in infancy and in mature age. ... I shall neset proceed to notice what belobyth considers to be the insuradiate cause of respiration. He supprosed, as we have mentioned above, that

a ni there are the following the following the first the following And the water that I have the state of the s -ly of encurrent estates of the first a that the dead in dead to have -ti which I have a thing of warm it made a deal the safe and a ley bor facilities made that of the a state of a facility to the facilities by bel marketing on which is no company that had made us an -uf the south events are the court of the state of the of l oly isu les s suff obse the C mou an accumulation of blood in the wefsels of the hungs, gives rise to an unpleasant and that this is the sole cause of the action of the muscles of instriction.

That there is an unfluesant sensation can be readi ly granted, but that this arises from an accumulation of blood, I can by no means allow - because any obstrue -tion to the circulation through the lungs would be marked by an obvious interreption in the fulle. . In ancurism for instance the infudiment to the circulation of the blood is much left than wohat De Whift would make us believe happens at every esopandron of the thorax, and yet in the ancurismal limb, a faultering or inter-- white milse is very perceptible, whilst in the operation of breathing it has never been noticed - a nother objection to this doctrine is, that when the circulation is very much increased as in high fevers then would be such an accumulation of blood as almost to produce suffication. but on the contrary do we not frequently observe high fevers, as in the common bilious when the breathing is not more hurried nor the uneasings more considerable than in the ordinary healthy state ?

allowed the same and the same of the same 6 h has been a first the contract of the second ce the th ri add to the the morning was to be in the collection or take leu Land I had a Cartherine been been been the advantage of the to -na to a actor before from the on the constitution in the out working aria -ph In the breathing of air which is deleterious or which contains but a small proportion of oseigen gas we feel a much more unplicatant sensation, which cannot of surely be attributed to an obstructed circulation.
To conclude, it would certainly be derogating from the wisdom of the Supreme Bring to suppose that he had formed a system so imperfect that its wants could not be supplied without calling in the aid of the immortal spirit, or that the hungs were so frame that an impediment to the circulation should give rise to the grand object of respiration without which we could no more live than without aliment.

The opinions we have noticed, not appearing to give satisfactory explanations of the cause of respiration. I shall proceed after a few brief remarks to advance what I consider to be more rational and concordant with Philosophical principles.

The necessity for a continual supply of fresh air could not long remain a secret to the philoso- phers of every age, but the use of which was not

a th n. the -ter to -tir the eni to administration of it comments to the market applies othe continued and the Pharton Secure long tha air cah

known writill the discovery of the component parts of the atmosphere. - Whilst some considered that the object of respiration was to cool the blood in the Lungs, others that the air was defined of its elasticity and that this was the only loft it sustained. I It is not necessary to orda repeated arguments to move that these notions are unfounded because they have long ago been laid aside. ... The grand object of respiration is to obtain a con--timual suffly of oxigen gas. This is now consented to by all modern philosophers - and that a con--timual demand for this vital fluid is the cause of the alternate inflation & collapse of the hungs appear evident from a few substantial facts. -It has been ascertained by excheriments on dogs and

It has been ascertained by eseperiments on dogs and other animals, that they can suffer submersion much longer after being made to breathe fune wital air, than after the inspiration of common atmospheric air — and that men after breathing oxygen gas can inspire acleterious gafses with less uneasiness

\* May not some of the uneasiness which our patients suffer in an advanced stage of pulmoel - mary consumption be ascribed to a scanty supply of oseigen gas. .. de twickers & weekling or alleger to by all supported by a large thank a sent the come Шч we specially have been a first and a second asserts is Continued and a secretary of the second of the no the dear the and the construction of the construction of the construction of The al the the -has air

than after the instruction of common air \* -That the theory I have survised is more than probable, by noticing the first cause of respiration. Much inservity has been displayed in edeavouring to account for the first restrication of infants. " Jours attribute the first instruction to the pain which children feel when they are first eschosed to the air, this is said to make them ery, whilst the air wishes down during this act. . . To this opinion I have a serious objection. It is well known to accoucheurs, that when the child is exchelled and the circulation thro' the chord it continued et does not breather, at least in many cases, makes no efforts to breathe untill the choid is compressed. This is so well known that Midwifes generally just a ligature on the chord soon after the expulsion of the child, provided they can see any marks of life, by the motion of the child - here although it is ex -posed, it does not breather consequently the reduced air councit be the brimary cause of restrication.

to account for the few to set worker of my will a series where the him he will be die a low to the and the construction of the same of the services of the same of th ex son the man he had been all the the son to and the first added t with a series of the last of the series of t to a w afr the the course of the second that are a second to be a second tou ift esca

Others have proposed to account for restriction by supposing that the struggles which the child makes in its passage from the womb, forced a greater quantity. of blood into the pulmonary vefsels, and by its distension gives pain this causes the child to relieve itself by elevating the thorase in an attempt to ery. I But why there should be a greater determination of blood to the hungs than to other harts of the body I am unable to conceive - and I welleve the ingeneous withor of this obvinion will find it as stifficult to discover any necessity for these violent struggles - But in order to compliatly overturn this theory I will mention an experiment which has often been tried . - The would of some of the interior animals have been afrered wear about the time they would have had their young - and when the bottle animals have been taken out, they were found to breather as regular as if they had been borne in the natural way . . It will be unnecessary to proceed faither in the escamination of different obvinions. The one which I shall embrace is founded on necessity, whereas

\* That there is something mon than wital air which is separated from the placenta is obvious. the growth of the child would assuredly no more proceed than a man could live for ever by breathing.

they had been borne in the material way.

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it is evident, all the athers I have named have been founded in accident or mechanical principles.

The fatus in utero is now generally acknowledged to receive its mutriment from the mother, through the midium of the placenta and its vefs cls. The Lungs in this state are quiescent and nearly useless, their function being entirely suspended by the office of the placenta, which latter is supposed to separate perform the hart of a gland and supplies the blood of the fatus with the same vital fluid that the lungs do when they are called to perform their function — To prove which it is only nearly any to compress the chord and the child is only nearly any to compress the chord and the child died . These facts being surmised I go on to state what I consider to be the first cause of respiration.

Immediately after the birth of the chief, when it is cut off from all communication with the placents, it begins to feel such a sense of want, on account of the oseigen being nearly expended in the system that it involuntarily elevates the chest in order to relieve the bainful sensation - when the lungs are filled with air and it has no longer become usefulfitis

the state of the s Control of the second of the s to a comment of the second of the second of the second of the the said of the said has a said and a said a interest latter is subject to severally liver that the the property will be a first of the first you a had a recovered to be the first energy required Land to the first of the state of the state of the same 6 and the Transplantance of years and of the said of All and the second of the seco the second of th

esofulled simply by the remittency of the cartilages of the ribs. - In this same manner I believe that restrication continues thro' life. the same structus which was the first cause of instriction continues , to act through life and comfrells us to relieve our wants - altho' in ordinary restrication we are but , little sensible of any uneasiness, yet we may soon on be convinced of the truth of the above obinion, by hald. a casing to breath for a few moments, when we involun tarily exercise the muscles of instrination. \_ ~ However different the obinions may be with res-- pect to the first course of respiration, it is now univer- en sally agreed that its object is the acquirement of osci igene gas and to discharge from the blood what would be injurious if retained . - without delaying to notice tous the subject of theeleadopt to the different hypotheses on this subject I shall adopt the obinion of Guttenner, who supposes that oseigen furnishes to the whole system the frenceple of writability. It is true that then has been moving ingenerous arguments & escheriments made, in order to disprove this supposition . - among the experimenters on this subject we find the celebrated abernethy, whose

expected sough, be the is iteree of the collecte the the self in the they some branch I before he the reflect the tenter to be the first file of the deline of the file the west and and it states the state of the device here is attended from a son ancestinos and not me many down le en endant of when it is and landhout nelsones to letter become start to the whole sign than the promes the glow takes

candour and abilities are at all times to be respected. but we must take the liberty to discredit the conclu--sions he has drawn from experiments made on the detached limbs of animals - for they can be no means throw light, in exchlaining the functions of the living is body. Mer abernethy thinks one of his experiments very conclusive - he fut the detached limb of a frog into an eschausted reciever, and found that it discovered a signs of life equally as long as one which had been ex -hosed to the open air - but this serves proves nothing we cannot suppose that the leg of a frog could have any action on the air - and the gradual extinction of life in that hart of the frog under the exhaustro reciever serves to prove that the principle of initability can eseist in those animals long after death, and that the gradual eschiction of life is owing to the consumptions of oseigen by degrees. ...

I have now concluded my observations on the theory and cause of restriction. I should have moceided to the different obinions on the changes which take blace in the system in consequence of

there we say the season of weeted of life equal to at long of the wines for theen to former to leave that the presenting of could have people it for it.

respiration, but as the time allowed me to write a differ -tation would not admit of this, I shall be content eid to make a few estracts from the theory of Dellurray ge whose ideas perfectly accord with my own ... all parts of the body and moducts of the system are tions formed from the blood. Its expenditure is constantly in supplied by the chyle. The beculiar character of animalmatter with regard to composition is a large proportion from of netrogen and a smaller proportion of earbon. It may therefore be inferred, that in the extreme vefsels, wherefen the arrival solids and fluids are formed, the general is trocess well be, the seperation from the blood of those elements of which animal matter is composed; and of course that carbon which enters more sharingly into its composition well exert in greater quantities in co the remaining blood. This is supposed to be the general nature of the conversion of arterial into venous blood, not sitrogen, hydrogen and other elements are spent in the formation of new products, and the proximate brinciples to of the blood probably the craftamentum chiefly, remainer with an increased Instruction of carlon. In this statem it is eschosed, under a very esctensive surface to the

and the second of the second s the whole he had been the the contract to the solution of course that exitors where the bear hear had The state of the s

atmospheric air in the Lungs, the oscigen of which ale the acts its except of carbon, and forms the carbonic acid which is eschired. — at the same time another change takes place to serve a different purpose. A supply of oscigen seems required to support the necessary actions of the system: a quantity of it is therefore absorbed in the hungs and expended in the esotreme vefsels. The combination of these changes, of the abstraction of earlier bey the attraction exerted to it by the oscigen of almost phenic air, and the absorption of another portion of oscigen with perhaps a small quantity of mitrogen, constitute the conversion of venants into arterial blood. —

Trown this view, we percent the final purpose of the process of respiration. In the estreme refsels the different constituent principles of the blood are expended in the nourishment of the solid fibre, in the formation of secretia fluids, and perhaps, in the support of the living howers. Carbon is the least of these principles that are esoperated in the formation of the solids and fluids, consequently it must be in lar ger proportion in the blood after it has undergone these changes. It is evident therefore that to

The state of the second of the which is at each first the whole states to be a first to the of the second of and the second s preserve the due proportion and prevent it from accummulating, it must be consumed by some other process. Hence the necessity of the application of oscigents the blood in the hungs, and the arrigin of carbonic acid which is uniformly eschired.

We thus too trace the brocess of animalization from its first step - the reception of the aliment to its com--teletion . - all animals live airectly or indirectly on wegetable matter. The principle difference in the composition of vegetable and animal matter is, in the former containing a larger brokortion of earlow. Respiration is the function by which this defference is established. The aliment received into the stomach is soon formed into a pluid capable of afsimilating with the blood. It is conveyed tathe Lungs and there loses a part of its earbon, or is tractically arimalized. It is then distributed thro' the system & in the exclusive vegets along some cartion parts with somuch by drogen oseigen withogen & other elements as still to leave the carbon predominant. By these reciprocal changes the conversion of vegetable into animal matter is effected.

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animal heat. This has been attributed to a great many causes, as combustion, electricity, friction, fermentation & phologiston. — It would require but little reflection to be convinced, that none of these are the cause of animal heat — the hungs where the process is sup-tosed to go on, would certainly be much warmen thankeny other braits of the body.

It is to be browford that we are indeleted for a complicat chierdation of this subject. The Dr has ascertained by expresiment, that arterial blood has a greater eapacity for heat than venous - his theory of animal heat is as follows . - In expiration a quan -tity of oscigen from the atmospheric air combines with carbon to form carbonic acid - calorie is at the same time exetricated in consequence of this combination. It blood at the same time is changed from venous into arterial, and by this change acquired an increased capacity for calorie . It therefore takes up the caloric that has been esetricated, and an increase of tempera turn is thereby prevented. The arterial blood is in - mediately carried in the course of the circulation to

and the metal of the Bear had a complete the second and the second and the second restruction to be commenced that now well as we trade an I also we have been the transfer on are the fact of the form a think a substitute to a second of the second of the second the state of the s some and a contract of the contract of the sound of the s Control of the Alexander of the second second sections. the eschence vefsels where it is gradually changed into the venous state. The calonic is slowly scherated during this change and thus may be eschlained the uniformity of temperature.

There had been some objections to this doctaine of animal heat. for instance, It has been said that the heat of the lower esotremities is very much increased in a short time after an operation for the poplitud anewish - but I think this may be satisfactorily accounted for. - When the great acting of the leg is tied, the blood has a centrifugal direction. It is driven into the smaller arteries on the surface of the limb, and a temporary in flamation is esceited. this I think is sufficiently established by the heat of the limb becoming natural in a pew days.

again. It has been observed that the heat of the body is less in old people "altho" they respire as often. This so far from Disproving our doctrine of animal heat tends to support it. In old heaple the circu-lation is more languid - consequently the arterial

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is not so soon changed in to the venous blood, and the ealorie is separated more slowly. In

It has been said that different stimuli increase the heat of the body, as the aliments, drinks prafsions of the mind we but this does not discredit our theory because all stimuli in crease the circulation, conse-quently this conversion of venous into arterial blood is more rapid - and in proportion as this change is more or less rapid will be the generation of aniunal heat.

With this I finish my essay. The impression, I am confident must be numerous - but I hope the shortness of time allowed me to write will be sufficient apology for all inaccuracies. I It only remains for me to return my sincere thank to one & all of the Professors of the reminerally of Penn - sylvania. The instruction as well as the many favours I have received from them, well can be

held in grateful remembrance

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the second second the second was the second bearing the the head treed was it that winterent alphanete extended a the mine see we must their Dock and the mineral of ment their Superior so and otherwise was also the superior sin special The desire to the test of the properties of an interest of the second 60 che the stand have alson . He say were I all could be seed the history could be the forest yadance in a cologia for all the decinations. of one is a contract of the sand the sand who execution - daylor will and with the wind and will be the second A Miles W. I have the real of the contract of delice was you be the live on the ware of



